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A REVIEW OF THE AMERICAN SPECIES OF STROMATEIDÆ.

BY MORTON W. FORDICE.

In the present paper I have attempted to collect the synonymy of the American species of *Stromateidæ*, and to give an analytical key for the identification of the species.

The specimens studied belong to the Museum of Indiana University.

Analysis of American Genera of Stromateidæ.

- a.* Ventrals very rudimentary or absent; preopercle entire; anterior rays of dorsal and anal fins more or less produced; scales very small and thin; caudal peduncle slender, not keeled; gill-membranes free from isthmus; caudal fin forked. *Stromateus.* I.

- aa.* Ventrals present, I, 5; edge of preopercle serrate; anterior rays of dorsal and anal fins not produced; scales rather small, firm; gill-membranes free from isthmus; caudal peduncle rather stout, not keeled; caudal fin lunate.

Leirus. II.

I. STROMATEUS.

Stromateus Linnæus, Syst. Nat., x, 248, 1758 (*fiatola*; *paru*).

Rhombus Lacépède, Hist. Nat. Poiss., ii, 321, 1800 (*alepidotus*).

Chrysostomus Lacépède, Hist. Nat. Poiss., iv, 97, 1800 (*fiutoloides* = *fiatola*).

Fiatola Risso, Eur. Merid., iii, 289, 1826 (*fareiata*).

Peprilus Cuvier, Regne Animal, 1828 (*crenulatus*).

Seserinus Cuvier & Valenciennes, Hist. Nat. Poiss., ix, 416, pl. 276, 1833 (*microchirus*).

Poronotus Gill, Cat. Fish. East Coast N. A., 1861, 35 (*triacanthus*).

Analysis of American Species of Stromateus.

- a.* Pelvis ending in a small spine; ventral fins entirely wanting.
b. Dorsal and anal fins falcate; the length of their highest rays greater than that of head; back elevated; body suborbicular; snout vertical; height of body $1\frac{1}{2}$ in length; D. III, 45; A. II, 43; vertebræ, 13+17; occipital crest very high, its vertical height from supra-occipital bone contained 3 in head (*Rhombus* Lac.). *paru.* 1.
bb. Dorsal and anal fins little falcate; the length of their highest rays less than head.

- c. Region below dorsal fin with a series of pores; outline elliptical; height of body $2\frac{1}{3}$ in length; D. III, 45; A. III, 37; vertebræ, 14+19; occipital crest moderate, the height from supra-occipital bone 4 in head (*Poronotus triacanthus*. 2).
- cc. Region below dorsal fin without conspicuous pores.
 - d. Form elliptical; height of body $2\frac{1}{4}$ in length; D. III, 45; A. II, 39; vertebræ, 14+17; occipital crest low, its height from supra-occipital bone $4\frac{3}{4}$ in head. *simillimus*. 3.
 - dd. Form broad-ovate; height of body, $1\frac{9}{10}$ in length; dorsal with 42 developed rays; anal with 32. *medius*. 4.
- aa. Pelvis not ending in a spine (*Stromateus*); no trace of ventral fins.
 - e. Upper part of body with numerous round black spots; head, $4\frac{1}{3}$; depth, $2\frac{1}{4}$; D. VII, 40-43; A. III, 38. *maculatus*. 5.

1. *Stromateus paru*.

Paru Brasiliensi congener Sloan, Jamaica, 2, 285, tab. 250, f. 4, 1727 (Jamaica).

Stromateus paru Linnæus, Syst. Nat., ed. x, 248, 1758 (based on Sloan's description); *ibid.*, ed. xii, 487, 1766; Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 597 (Charleston, S. C.); Jordan & Gilbert, Syn. Fish. N. A., 914, 1882.

Chatodon alepidotus Linnæus, Syst. Nat., ed. xii, 460, 1766 (Charleston); Gmelin, Syst. Nat., 1240, 1788 (copied).

Rhombus alepidotus Lacépède, Hist. Nat. Poiss., ii, 321, 1800 (copied).

Peprilus alepidotus Goode, Proc. U. S. Nat. Mus., 1879, 112 (Fernandina); Goode & Bean, Proc. U. S. Nat. Mus., 1879, 130 (Pensacola); Bean, Proc. U. S. Nat. Mus., 1880, 92 (Beaufort, N. C.; Norfolk).

Stromateus alepidotus Lütken, Spolia Atlantica, 1880, 521; Jordan & Gilbert, Syn. Fish. N. A., 1882, 451; Bean & Dresel, Proc. U. S. Nat. Mus., 1884, 156 (Jamaica); Jordan & Gilbert, Proc. Acad. Nat. Sci. Phila., 1884 (Egmont Key).

Sternoptyx gardenii Bloch & Schneider, Syst. Ichth., 494, 1801 (Carolina).

Stromateus gardenii Günther, Cat. Fish. Brit. Mus., ii, 399, 1860 (New Orleans; Jamaica; Bahia).

Stromateus longipinnis Mitchell, Trans. Lit. Phil. Soc. New York, i, 366, 1814 (New York Bay).

Rhombus longipinnis Cuvier & Valenciennes, Hist. Nat. Poiss., ix, 401, pl. 274, 1833 (New York); Dekay, New York Fauna, Fish, 136, pl. 75, f. 239, 1842.

? *Seserinus xanthurus* Quoy & Gaimard, "Voy. Freyc. Zoöl., 384, 1824."

? *Rhombus xanthurus* Cuvier & Valenciennes, Hist. Nat. Poiss., ix, 405 (Brazil).

? *Rhombus argentipinnis* Cuvier & Valenciennes, Hist. Nat. Poiss., ix, 405, 1833 (Montevideo).

? *Rhombus crenulatus* Cuvier & Valenciennes, Hist. Nat. Poiss., ix, 410, 1833 (Cayenne).

? *Rhombus orbicularis* Guichenot, "Mem. Soc. Imp. Sc. Natur. Cherbourg, xii, 245, 1866" (Cayenne).

Habitat.—New York to Jamaica, also *probably* southward to Brazil.

As Dr. Bean has shown the identity of the northern fish with that found in Jamaica, there seems to be no doubt of the propriety of retaining the name *paru* for this species.

Possibly the South American species (*xanthurus*) is different, the number of fin rays being given as D. IV, 40; A. III, 39.

2. *Stromateus triacanthus*.

Stromateus triacanthus Peck, "Mem. Amer. Acad., ii, pt. 48, pl. 2, f. 2, 1804" (New Hampshire); Günther, Cat. Fish. Brit. Mus., ii, 398, 1860 (Boston; New York); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 597 (Charleston, S. C.); Jordan & Gilbert, Syn. Fish. N. A., 451, 1882.

Peprilus triacanthus Storer, Fish. Mass., 60, 1839 (Massachusetts).

Rhombus triacanthus Dekay, New York Fauna, Fish, 137, pl. 26, 1842 (New York Harbor).

Poronotus triacanthus Gill, Cat. Fish. East Coast N. A., 1861, 35; Jordan & Gilbert, Proc. U. S. Nat. Mus., 1878, 377 (Beaufort, N. C.); Bean, Proc. U. S. Nat. Mus., 1880, 91 (Wood's Holl, Mass.; Noank, Conn.; Eastport, Me.; Portland, Me.; Norfolk, Va.; Tompkinsville, N. Y.; Banquereau; Vineyard Sound; Gloucester, Mass.).

Stromateus cryptosus Mitchill, Trans. Lit. Phil. Soc. New York, i, 365, pl. 1, f. 2, 1814 (New York Bay); Cuvier & Valenciennes, Hist. Poiss., ix, 408, 1833.

Habitat.—Nova Scotia to Charleston.

The nomenclature of this species offers no difficulties. The generic name *Poronotus* proposed for it by Dr. Gill, seems unnecessary, as the species is evidently very closely related to *S. simillimus*, which lacks the series of pores, on which *Poronotus* was based.

On examination of the skeletons of the three species, *S. paru*, *triacanthus*, and *simillimus*, I find the first interhæmal greatly developed in each of the species. The occipital crest is very high in *S. paru*; it is medium in *S. triacanthus*, and low in *S. simillimus*. The hæmal and neural spines are more developed in *S. paru* than in the other species, thus corresponding to the form of the body. The vertebræ in *S. triacanthus* are somewhat more numerous than in the others, as stated in the analytical key.

3. *Stromateus simillimus*.

Poronotus simillimus Ayres, Proc. Cal. Acad. Nat. Sci., 1860, 84 (San Francisco); Cooper, Nat. Wealth Cal., 1868, 489.

Stromateus simillimus Rosa Smith, Fish. San Diego, 1880 (San Diego); Jordan and Jouy, Proc. U. S. Nat. Mus., 1881, 12 (San Diego; Santa Barbara); Jordan and Gilbert, Proc. U. S. Nat. Mus., 1881, 46 ("Entire Pacific Coast, common, but most abundant from Santa Barbara to San Francisco"); Bean, Proc. U. S. Nat. Mus., 1881, 265 (name only); Jordan and Gilbert, Syn. Fish. N. A., 1882, 451.

Habitat.—Puget Sound to San Diego.

This species is common along the Pacific Coast, where it replaces *S. triacanthus* of the Atlantic Coast.

4. *Stromateus medius*.

Stromateus medius Peters, Berliner Monatsbericht, 1869, 707 (Mazatlan); Lütken, Spolia Atlantica, 1880, 521; Jordan, Proc. Phila. Acad. Nat. Sci., 1883, 284 (original type).

This species is now only known from the original type in the Museum at Berlin, erroneously described by Dr. Peters. In 1882 numerous specimens were collected at Panama by Prof. C. H. Gilbert, but all of these have been since destroyed by fire.

5. *Stromateus maculatus*.

Stromateus maculatus Cuvier and Valenciennes, Hist. Nat. Poiss., ix, 399, 1833 (Valparaiso); Jenyns, "Zool. Beagle, Fishes," 74, 1839; Gay, "Hist. Chile, Zool.," ii, 248, Atl. Ictiol. lam., 3 bis, f. 1; Günther, Cat. Fish. Brit. Mus., ii, 398, 1860.

Habitat.—Coast of Chili.

Head¹ $4\frac{1}{3}$ in length of body; depth $2\frac{1}{4}$; D. VII, 43; A. III, 39. Scales in lateral line about 160. Body ovate, compressed,

¹ The description of *Stromateus maculatus* was added by Seth E. Meek, who alone is responsible for it.

dorsal and ventral outlines very similar to each other. Profile evenly convex (with curve a little shorter at occiput) to snout in front of nostrils, where it descends almost vertically. A slight depression on each side of head, above nostrils, which makes the profile more trenchant at that place.

Mouth not very small; the tip of maxillary does not quite reach vertical from front of eye; its length about $4\frac{1}{4}$ in head. The teeth of the lower jaw pass just behind those of the upper jaw, when the mouth is closed. Eye small, $5\frac{1}{4}$ in head. Pseudo-branchiæ well developed. Gill-rakers weak and flexible, 12 below the angle, the longest about $\frac{2}{3}$ eye. Preopercle entire. Branchiostegals 6. Pelvis not ending in a spine. No trace of ventral fins. No pores along the base of dorsal fin. The soft dorsal and anal fins similar to each other, except that the anterior rays of dorsal are correspondingly higher than those of the anal.

The dorsal spines are distant from each other, and quite imbedded in the skin. The first spine is on the vertical above, from upper part of gill-opening. Distance of first ray of soft dorsal to tip of snout equals the depth of the body. Distance from first ray to last ray of soft dorsal is contained $1\frac{1}{4}$ in length of body. Distance of first ray of anal to tip of snout about 2 in length of body. Base of anal 2 in length of body.

The mucus-pores on upper anterior part of head form a sort of irregular network. A main branch arises a little anterior to upper part of gill-opening, which sends off branches, extending backwards almost straight, and parallel to each other.

The greatest width of head 2 in its length; the greatest width of body (midway on a line from upper part of gill-opening to base of last anal ray) $2\frac{1}{2}$ in head. Cheeks and opercles scaly.

Color in alcohol blue above, with numerous round dark blue spots, about $\frac{1}{2}$ as large as eye; below silvery. Below pectorals, on anterior half of body, are some irregular blue markings. Pectorals blue; caudal yellowish, with faint bluish shade on tips of its rays. The pectoral fins are about as long as head.

The above description was taken from a specimen in very good condition, from Rio Grande do Sul, South America. The specimen is in the Museum of the Academy of Natural Sciences of Philadelphia. It was originally sent there from the Museum of Comparative Zoology. Length of specimen, 14 inches.

II. LEIRUS.

- Leirus** Lowe, "Proc. Zool. Soc., London," 1839, 82 (*bennetti* = *ovalis*).
Palinurus Dekay, New York Fauna, Fish, 118, 1842 (*perciformis*).
Crinus Valenciennes, "Webb and Berthelot, Isles Canar. Poiss." (*bennetti*).
Pammelas Günther, Cat. Fish. Brit. Mus., ii, 485, 1860 (*perciformis*).
Palinurichthys Gill, Proc. Acad. Nat. Sci. Phila., 1860, 20 (*perciformis*).
Palinurichthys Bleeker, about 1860 (*perciformis*).

Analysis of American Species of Leirus.

- a. Body ovate; the greatest depth, $2\frac{1}{2}$ in length. Head, $3\frac{1}{3}$; D. VIII, 20; A. III, 16; Lat. l. 75. *perciformis*. 1.
 aa. Body more elongate, its greatest depth $3\frac{1}{5}$ in length. Head, 3; D. VIII-IX, 26-28; A. III, 18; Lat. l. 80-90. *peruanus*. 2.

I follow Jordan and Gilbert in regarding *Leirus* as a genus distinct from *Centrolophus*, from which it differs chiefly in the differentiation of the dorsal spines, and in referring to *Leirus*, the *Palinurichthys perciformis* of American writers, which appears to be a near relative of *Leirus ovalis*, although Dr. Günther has placed it among the *Carangidæ*.

1. *Leirus perciformis*.

- Rudder fish* or *Perch coryphene* Mitchill, Lit. Phil. Soc., i, pl. vi, f. 7, 1814 (no description).
Coryphene perciformis Mitchill, Am. Month. Mag., ii, 244, 1818 (New York Harbor).
Palinurus perciformis Dekay, New York Fauna, Fish, 118, pl. xxiv, f. 25, 1842 (Shrewsbury Inlet).
Pammelas perciformis Günther, Cat. Fish. Brit. Mus., ii, 485, 1860 (Coast of New York).
Palinurichthys perciformis Gill, Proc. Phila. Acad. Nat. Sci., 1860, 20 (name only); Bean, Proc. U. S. Nat. Mus., 1880, 91 (Wood's Holl, Mass.; Off Noman's Land; New York Market; Newport, R. I.; Gloucester, Mass.; Fishing banks, off coast of Maine).
Lirus perciformis Jordan and Gilbert. Syn. Fish. N. A., 452, 1882.
Trachinotus argenteus Storer, Mass. Rep., 55, 1839 (Holme's Holl, Mass.; not of Cuvier and Valenciennes).

Habitat.—Maine to New York.

This species has apparently but a limited range on our Atlantic coast. It is apparently congeneric with *Centrolophus ovalis* Cuv. and Val., the type of Lowe's genus *Leirus*.

2. *Leirus peruanus*.

Centrolophus peruanus Steindachner, Ichthyologische Beiträge, i, 10,
1874 (Callao).

Habitat.—Coast of Peru.

This species is known to me only from Steindachner's description.